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Control of Nanostructure of Block Copolymer Particles through Size and Aspect Ratio-controlled Nanoparticle Surfactants KANG HEE KU, JAE MAN SHIN, HYUNSEUNG YANG, BUMJOON J. KIM, KAIST — Due to the high surface area of nanometer-sized colloidal particles relative to their volume, the interfacial interaction between block copolymer (BCP) chains and surfactant surrounding the emulsion droplet greatly affects the final internal morphology of BCP particles. Convex lens-like functional BCP particle with defect-free porous cylindrical channels was created via precise design of interfacial interactions between Nanoparticle (NP) surfactants and BCPs. The effect of size and aspect ratio of nanorod (NR) surfactants on the shape and internal morphology of BCP particles was systemically investigated using polystyrene-b-poly(4-vinylpyridine), Au NPs, and CuPt NRs. Both size and shape-induced segregation of NPs generated the balanced interfacial interaction between BCPs and water, and this neutralized interface combined with the directionality of solvent generated defect-free, vertically ordered porous channels within the particles. Furthermore, these particles could possess unique optical, chemical and catalytic property by loading various metal nanoparticles into the porous channels.

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